

Sales of Carbonless Forms Spurred by Paper Shortage



by WILLIAM J. PEVERILL

John Gardner once said "We are continually faced with a series of great opportunities brilliantly disguised as insoluble problems." His words surely apply to the situation now surrounding carbonless papers. While the information covered in this article might always have been useful, a strong case can now be made that unless you know about these products, you will not be able to earn a living in this industry.

Here's what we will cover in this article:

1. A discussion of the market place and the thrust given carbonless papers by the "Paper Crisis."
2. A full description of carbonless paper types, their characteristics and functional properties.
3. Cost and other considerations on carbonless business forms.
4. A current comparison and application profile of mechanical versus chemical carbonless types.
5. Forms design and construction factors in carbonless paper usage.
6. The "new" market for carbonless.

Most of us have read, heard—even felt—the developing impact of the paper shortage. It is estimated that the requirements for register bond papers will grow from 800M tons in 1973 to 1200M tons in 1977. While these estimates do not adjust for a recession, it appears that even allowing for a significant business downturn, there will not be sufficient capacity to fulfill this need.

Carbonless business forms have enjoyed a growth for some time substantially greater than that of the business forms industry as a whole. But what is now providing an unprecedented and dramatic new thrust is the "paper crisis" which has developed in register bond papers and carbonizing tissues. Some ask "But how come? Carbonless doesn't eliminate trees!"

Carbonless papers are on the higher end of the profit spectrum. There are trade offs taking place—and more will develop—between carbonless and register bond as well as other industrial papers. Moreover, for much the same reasons, carbonless papers are an important element in the long range marketing strategy of several large paper companies. Carbonless simply will be easier to get than other papers.

Equally important, carbonless papers eliminate carbon paper. Carbonizing tissue is now in critically short supply. Higher profits are available on other tissue grades (e.g. cigarette tissue). What is more, looking to the long range prospects of carbonless papers, mills are unwilling to commit additional capacity and especially funds to carbonizing tissue—a self fulfilling policy as it pertains to carbonless. Another factor—some of the ingredients: waxes, oils, and colors are developing shortages too.

It seems clear that carbonless papers could easily take a giant step in usage. Not so evident are the characteristics of that market. More later on this.

The advantages provided by the use of carbonless forms are at once apparent—elimination of de-leaving, carbon disposal, excessive smudging, bulk in feeding, shipping and storing, and, for some carbonless papers, substantially increased manifolding. The most important sales barrier, the difference in price of carbonless forms compared to carbon-interleaved forms, is narrowing. More important the overall cost of the forms, including use cost, is being more fully evaluated. Value analysis—total cost consideration—is enhancing the use of these products.

Carbonless papers are generally classified in two categories: chemical transfer and mechanical transfer. In each case, there are two classifications—"mated" and "unmated."

Chemical Transfer (Mated)

The mated chemical type utilizes a system of matching sheets to create an image where pressure is applied. To form the image, a special coated surface (CF) must be facing a capsule coated surface (CB). When pressure is applied to the top part of the form set (CB) the small capsules coated on the back are broken releasing a dye. The dye reacts with the special coating on the facing sheet (CF) to produce an image.

When more than two carbonless sheets are used, an intermediate sheet coated with the mating chemicals on the front and cells on the back is employed (CFB). It can receive an image on its front side and send an image to a mating sheet beneath it.

There has been at least one new supplier of chemical carbonless papers added each year for the past few years. Increasingly viable, the list now includes at least the following suppliers—Appleton Coated Papers (NCR), Mead Paper Corporation, The 3M Company, Champion Papers, and Nashua Corporation. Each company has expanded its product line to be comparable with the leading producer.

Each of these manufacturers furnish their products in a "full range" of standard weights, including bond, ledgers, tags, safety, translucent, and some rag content papers. In general, the heavier weights (over 20#) are available only in coated front (CF) but some are available also in coated back (CB). Some special grades are available on request. At this time only 3M will furnish a dry gum (on back) CF grade and only NCR offers a 12-1/2# coated front and back (CFB) grade.

Colors are somewhat limited. Bond grades are available in canary, pink, green, blue, and goldenrod. NCR's 12-1/2# CFB is available only in white. The NCR

and other products give a blue cast image. 3M's Type 200 provides a purple cast image.

NCR has introduced a new paper which provides a black image. At present it is available in only 17# CFB, 15# CB, and 14# CF and is premium priced—approximately 10-15%.

Most of the manufacturers now offer a 14# CFB—and this product is making considerable inroads on the traditional 16-17# CFB grade. Providing additional manifolding capability—an extra two or three copies—it is approximately identical in cost and is available in colors. This product will probably become the industry standard replacing the 17# grade.

NCR's 12# CFB product is "alive and well" and produced here in the United States. Higher in cost (25% approximately), available only in white, it has outstanding manifolding capabilities.

Several suppliers are now furnishing a lower cost, limited application, chemical carbonless product resulting in about 5%-10% savings in cost. Suitable for four or less copies, it is finding its way into some of the staple product types especially stock continuous forms.

All standard fastening, techniques—gluing, crimping, and stapling—are possible with any of these papers.

In the handling of these papers, extreme heat and pressure must be avoided. Decollating is accomplished almost as easily as with regular bond except in the case of the 12.5# lightweight paper which is more difficult to handle.

It is possible to combine carbons with any of these products. 3M's product can be used with standard carbons.

These products are not, however, compatible with each other. This, of course, presents some considerable difficulty for the manufacturer.

Desensitizing is accomplished by applying a desensitizing fluid to the CF surface, usually with rubber plate.

In general, erasures cannot be made successfully without destroying the CF surface required for subsequent writing.

The manufacturers will not guarantee the shelf life of these papers, although indications are that copies filed under normal conditions are good for at least 10 years and perhaps longer.

Virtually all of the chemical transfer papers are now copiable, although there are some subtle quality differences among suppliers. Since, however, there is still a sizeable inventory of "uncopiable" paper you must still request this specification to be assured of it.

Chemical Carbonless (Unmated)

The unmated chemical type is self-contained paper which forms its own image in response to concentrated pressure. The product consists of tiny chemical cells. Each cell contains a tiny amount of image-forming dye, surrounded by a pressure sensitive shell which ruptures in response to pressure. The image-forming chemical is released and reacts with a mating chemical outside the cell to form an image.

Generally, these papers are used by themselves for ribbonless entry or in combination with a bond or other paper in the first position (allowing a wider paper selection for the first copy). Since the first copy is usually bond paper the cost of this product is sometimes slightly less than the mated variety.

The self-contained chemical type carbonless papers are available from NCR and 3M (Type 100). NCR's standard product is a 14# paper. 3M's is 12# or 15#. 3M offers a "full range" of bond, safety, translucent, tag, and ledger paper. Performance is essentially the same except for image color: NCR's is bluish, 3M's is a purple cast.

Each company also offers a number of heavier weights, even tag. Not as many copies can be expected from these papers as from the mated chemical type.

Mechanical Transfer (Mated)

The mated mechanical transfer product also utilizes a system of matching sheets, CF, CFB, and CF. Imaging is accomplished by a physical transfer of the CF coating to the CF surface. The CF surface is coated with a waxlike substance which tends to remove the CF coating and transfer it to itself.

Over the past several years there have been at least a dozen suppliers of mechanical transfer carbonless papers. During the past year, both St. Regis and Computer Copies Corporation discontinued production of the product and at this time Frye Copysystems is probably the only viable supplier of these papers (although UARCO and Ennis Business Forms produce for their own consumption).

The most common types are 12# (coated) referred to as lightweight and 14# (coated) referred to as medium weight.

The availability of paper stocks is more limited in the mechanical transfer carbonless papers than in chemical types. CB and CFB papers are generally only available in up to 20# weights. Heavier weights are generally available only in the CF coatings. Colors available in these papers are limited to canary, pink, green and blue.

The product characteristic impelling most forms users to the choice of these products is their manifolding capabilities which are superior by comparison with carbon-interleaved forms or other carbonless types. All of these products provide a black copy and make an excellent original for use on a copier.

There are no problems in compatibility of these papers with carbon paper. Carbon is often used in combination, especially where backers are required. Moreover, some forms combine these papers with the chemical carbonless variety as well as carbons and bond paper.

A new paper is being produced with an "almost white" CB coating. Although this reduces manifolding by approximately two parts it overcomes somewhat the "cosmetic" objection to the standard grey back product and under certain conditions it can be backprinted.

Perhaps the greatest barrier to the use of these papers is in the decollating of continuous forms. Handling is more difficult than with bond papers, especially with the lightweight product. The medium weight product is less troublesome. Experienced operators, however, have learned to handle even the lightweight sheets.

A great many of the forms made with these papers require special fastening. Stapling and gluing are no problem to experienced manufacturers. An especially tight crimp is possible. In fact, crimping requires some caution—it can be too tight!

These papers can be desensitized by applying a desensitizing fluid to the CB surface. It is possible, too, to stripe-coat mechanical carbonless papers (as with carbon papers), which cannot be done with the chemical product. Shelf life of these papers is said to be "equal to carbon paper." These products are printed by wet or dry offset or rubber.

Mechanical Transfer (Unmated)

These products are made by Frye (Hi-Mark) and Ennis Business Forms (Novo-Script). The Frye product provides a choice of black or blue imaging. The Ennis product creates a purple image (Novo-Script). The unmated mechanical transfer product is designed to work without a CF surface. Transfer is accomplished in a manner similar to that of carbon paper.

The unmated type will work with ordinary bond paper, resulting in so called "accidental transfer." The mated variety, while not designed to do so, will also behave in a similar manner to a more limited degree.

Because of the elimination of the CF coating and the use of a bond sheet in the last part somewhat lower costs are possible. The absence of this coating creates a more functional ballpoint pencil form, important in some uses.

All the other characteristics attributed to the mated type generally apply as well to these papers.

Mechanical Versus Chemical

The mechanical and chemical types once considered as having distinct and almost mutually exclusive markets, now provide considerable overlap. The development of the light weight chemical products has opened up new uses in forms of a greater number of parts. Increasing consumer acceptance of mechanical transfer papers and the lower costs made possible by the UNMATED types (which require no CF coating) has made it possible at least for mechanical transfer papers to increase their share of the market which is now less than 10%.

Because of appearance and certain functional properties, mechanical will continue to be heavily dominated by the chemical types but even a few percentage points of market share can provide considerable growth in a market which is growing in the overall as this one will.

Other Considerations

The raw materials used in making carbonless forms usually cost two to three times as much as register bond papers and some up to five times as much. This, of course, offsets the procurement cost advantage of eliminating carbons.

There is a heavy cost penalty involved in buying any of the carbonless papers in small quantities. The alternative, carrying a large inventory, creates another kind of burden: it is estimated that it requires at least three times the dollar amount of inventory to service a given volume of carbonless forms sales as it would to service the same volume of carbon-interleaved sales.

Having too little paper to finish a job can be very costly and having too much can also develop a special kind of waste unless the manufacturer has a steady flow of this kind of business. Percentage of waste, owing to excess trim and expensive set up generally runs as much as 25% higher.

Carbonless papers are generally printed at slower press speeds than bond paper. Seldom is carbonless paper run two or three "up." Wide web widths are exceptional. This is due partially to procurement and availability but mainly owes to the fact that coated papers present problems in caliper variation which are more extreme in wide webs.

New Cost Developments

Despite these problems, the price gap between carbonless and carbon-interleaved forms is narrowing. This is due to:

1. The considerable room for improvement in the above factors. Specialized manufacturers are especially overcoming these problems.
2. Increased volume.
3. Increased price competition.
4. Introduction and acceptance of several lower cost carbonless products.
5. Substantial increases in the price of bond and carbons.

Forms Design and Construction Factors in Carbonless Paper Usage

Probably the most often considered factor in using carbonless papers is that of manifolding. The products are frequently considered because of their superior performance compared to carbon interleaved. But sometimes they are used for other reasons and (depending on the product) there is concern that manifolding will not be comparable to carbon interleaved forms. My own company furnishes a use selection chart for determining capabilities but we recommend that dummy sets be tested on any new installation.

Desensitizing of carbonless forms is a technique that is bound to continue growing in popularity. Used for making the carbonless transfer inert so as to omit information, desensitizing makes possible faster delivery (than spot carbon) and in some cases is actually less expensive than spot carbon.

In the chemical types, desensitizing is accomplished by applying a special ink to the **CF surface of the paper**. In the mechanical types, this is achieved by applying a varnish like fluid to the **CB surface**. In the case of the mechanical type, this prevents transfer to the subsequent sheet but it should be noted that the reverse of this subsequent sheet will create a mirror image if it is a CFB paper. If complete secrecy is desired it will be necessary that the desensitizing take place in the next to last sheet (since the last sheet has no CB coating) or that the desensitizing be continued in each subsequent sheet for the balance of the form.

Desensitizing is still somewhat of an art and not a science. The manufacturer must balance the requirement of printing only enough fluid to provide desensitizing—not so much as to create “tracking” or so little as to be inadequate to achieve the purpose. We recommend that desensitizing not be used where the desensitizing areas are greater than 1/3 of the total forms area. Moreover, tolerances are such that $\pm 1/16$ (or $1/8$ ” overall) should be allowed for.

Mechanical transfer papers can be stripe coated—as with carbon paper. If the design of the form lends itself to a full stripe, we recommend this technique—it's cheaper and more positive.

While on the subject of desensitizing, we should mention several forms of accidental (undesired) desensitizing. Yellow ink is a fairly effective desensitizer

and should be avoided in chemical transfer carbonless paper forms if print out is to take place in the areas covered by the yellow ink. Stencil labels and hecto-graph carbon if left only a few weeks in contact with the chemical transfer carbonless papers will desensitize these papers. We recommend the use of mechanical transfer papers in these applications.

The combination of carbon paper and chemical transfer carbonless paper creates a compatibility problem in some brands. A special and more expensive carbon paper is required in all but the 3M papers. There is no compatibility problem in the case of mechanical transfer papers.

The use of crash numbering is becoming almost universally accepted in carbonless forms. Since this technique guarantees precise coincidence of part-to-part numbers and costs so much less, it seems unnecessary to use press numbers for carbonless forms. On forms of a substantial number of parts there is almost no way a manufacturer can adequately price for press numbering. The considerable pressure used in collator numbering is such that if crash numbering will not work you can rest assured that the **forms in actual usage will not work either.**

The absence of carbon paper provides for some extra versatility in construction as it applies to fastening. Staggered glue lines are possible and will create a quite flexible form even in those of a considerable number of parts.

In order to provide a positive glue line in **mechanical** transfer forms an uncoated stripe is required for gluing purposes. The absence of such a striped area is however used in some forms design where a “peel away” glue line is desired—these hold the parts together for mailing only. After receipt, the parts can be peeled without tearing the paper.

Special caution is required in the use of crimping. Crimplocks need not be as prevalent nor as tight as with carbon interleaved forms and it is possible to create a crimp where it may require a gorilla to separate the forms.

The New Market For Carbonless

The market for carbonless business forms (not including certain roll specialties) now approximates \$200,000,000 annually. Respected industry opinion projects this market to \$400,000,000 to \$500,000,000 by 1977 and some believe it quite conceivable that carbonless will be 1/3 of the overall business forms market by 1980 or about 1 billion dollars. Such estimates do not adjust for recession possibilities but do give appropriate weight to the thrust provided by the paper shortage. It is interesting to note that the market for carbonless business forms in Europe is already 1/3 of the total market.

But the market for carbonless will change in character. Most carbonless forms—maybe 85% are now unit set forms. Carbonless already enjoys a significant portion of the small (typically unit set) manufacturer's market. While this market will continue to grow at well above average growth rates,

it is a smaller segment of the total business forms market and already using a fair amount of these products.

The new market should be heavily slanted towards continuous. In the first place, the major producers of business forms are about 70% in continuous forms. If these producers are to shift important tonnage, it must be to the continuous segment. “That's where it's at.”

Another development—the new, small mini computer market. There are a number of factors which will impell the mini computer installation towards the use of carbonless materials. The typical firm installing this equipment has had no previous computer experience. Anxious to get his new operation running in good order, he is not especially troubled by slight cost premiums within reason. He is influenced by performance, and to some degree by appearances.

Generally speaking, too, the forms orders are relatively small quantities. This makes a big difference in comparative cost because the flat charges figure more importantly in total cost, and because the overall total difference is relatively small.

Many of the forms used in minicomputer installations are hand separated, which overcomes one of the objections—deleting—sometimes attributed to premium, especially lightweight, materials. Forms threading, a rather considerable problem on the typical mini computer, is made easier with carbonless materials.

But, the primary purpose in using premium materials in these installations is to achieve greater manifolding. Prior to making this installation, the forms user has been executing his forms on the tabulating machine, a typewriter, or some method which is capable of producing more copies. Often this same user brings with him a continuing need to deliver the same number of copies as previously. Where this requirement exceeds four or five copies, this simply cannot be done using standard papers and carbons on the typical printer used in these installations.

The continuous segment of the carbonless market is perhaps today no more than 15% of the total. Imagine this segment growing to 50% or more of a market which is \$500,000,000 in five years!

The problems associated with carbonless **continuous** forms—fastening, computer print out, and of great importance (especially with the lighter weight sheets)—refolding—have been virtually put aside for lack of importance. The paper mills and converters as well as forms manufacturers must address themselves to these rapidly developing but different requirements.